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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/594,868	09/28/2006	Klaus Rose	09997.0138USWO	8198

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EXAMINER	
HORNING, JOEL G	
ART UNIT	PAPER NUMBER
1712	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/594,868	ROSE ET AL.	
	Examiner	Art Unit	
	JOEL G. HORNING	1712	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 June 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 9-20* is/are pending in the application.

4a) Of the above claim(s) *14-20* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 9-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *06-30-2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 30th, 2010 has been entered.

Status of Claims

2. In the response of June 30th, 2010, applicant has submitted a new IDS and argued the validity of the rejection. No claims have been amended, cancelled or added. Claims 1-7 and 9-20 are currently pending.

Election/Restrictions

3. **Claims 14-20** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on June 22nd, 2009.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. **Claims 1-4, 7 and 12** are rejected under 35 U.S.C. 102(b) as being anticipated by Fraunhofer ("Fraunhofer ISC Annual Report 2003," Germany: Fraunhofer ISC, 2004, as supplied by applicant).

January 2004 is assumed to be the publication date of this art, since that is the date of the preface.

Fraunhofer teaches a process where, as seen in figure 2, a sample is introduced between two electrodes (which are separated by a layer of Al_2O_3, a dielectric, making the process a dielectric barrier discharge process). The atmosphere between the electrodes is controlled so that plasma is generated. Then an inorganic-organic hybrid material formed via sol-gel processing (so it is cross-linked) is introduced into the plasma discharge as a precursor for the polymeric film (**claims 1,** pages 18-19).

As seen in figure 2, a carrier gas is also introduced into the plasma discharge **(claim 2)**. Additional precursor components can be combined together to produce the desired film **(claim 3)**. The process occurs at atmospheric pressure, which reads upon applicant's claimed range **(claim 4).** The coatings can offer improved scratch resistance **(claim 7)**. The precursor is sprayed into aerosol droplets, so it is applied as a liquid precursor **(claim 12)** (pages 18-19).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

> the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. **Claims 5, 6, 10-11 and 13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fraunhofer ("Fraunhofer ISC Annual Report 2003," Germany: Fraunhofer ISC, 2004, as supplied by applicant) in view of Goodwin et al (WO 03/086031, as supplied by applicant).

6. Regarding **claim 5,** Fraunhofer does not teach the frequency of its dielectric barrier AC discharge, however, Goodwin et al is also directed towards using dielectric barrier discharge in a plasma enhanced method for coating substrates with a precursor aerosol [0019] in order to form organic/inorganic siloxane films [0046], it teaches using a frequency of 29kHz [0061], which is within applicant's claimed range.

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to utilize 29kHz as the AC frequency for the dielectric barrier discharge of Fraunhofer, since it was known to be a suitable frequency for that purpose and would produce predictable results **(claim 5).**

7. Regarding **claims 6 and 13**, Fraunhofer teaches that the substrate of its process "is not limited to specific kinds of substrate materials"(page 19), but does not specifically teach applicant's claimed substrates.

However, Goodwin et al teaches the substrate useful for depositing layers can be a moving web [0017], which can comprise a plastic [0042].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to deposit the films of Fraunhofer onto a plastic moving web, since such substrates were known as desirable substrates for such dielectric barrier discharge processes, and would produce only predictable results **(claims 6 and 13)**.

8. Regarding **claim 10**, Fraunhofer does not teach adding colloidal metals to the precursor. However, Goodwin et al further teaches that the pre-polymer mixture can also comprise colloidal metals in order to impart conductivity to substrate surface or modify its optical properties [0046].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to add colloidal metals to the precursor stream in order to make the coating conductive or to modify its optical properties **(claim 10)**.

9. Regarding **claim 11**, Fraunhofer does not teach the identity of the gases added to the aerosol to make the plasma. However, Goodwin et al further teaches helium, oxygen, nitrogen, hydrogen and/or argon are suitable process gases for the plasma which can be selected to make the process gas as oxidizing or reducing as desired, in order to modify the chemistry of the coatings [0032-0033], which can be supplied

from a separate source **75** from the aerosol nozzle **74** before it is mixed together in the chamber [0052] (figure 3).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to utilize helium, oxygen, nitrogen, hydrogen and/or argon as process gases separately mixed with the aerosol precursors of Fraunhofer in order to further control the chemistry of the deposited coatings, since they were known for that purpose in such plasma enhanced processes and would produce predictable results **(claim 11)**.

10. **Claim 9** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fraunhofer ("Fraunhofer ISC Annual Report 2003," Germany: Fraunhofer ISC, 2004, as supplied by applicant) in view of Haas (Surface and Coatings Technology **111** (1999) 72-79, as supplied by applicant).

Fraunhofer teaches using "ORMOCER®s" as the sol-gel produced precursors of its process, but it does not teach what compounds are used to make the "ORMOCER®s" page 18).

However, Haas teaches that "ORMOCER®s" suitable as coating materials can be made using silicon alkoxides (section 2, Synthesis and application of ORMOCER®s as coating materials), such as tetraethyoxysilane (figure 3).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to use tetraethoxysilane as the precursor for the inorganic-organic hybrid pre-polymer of Fraunhofer, since it was known to be a suitable precursor for

ORMOCER®s that were to be used for coating applications, which would produce predictable results.

11. **Claims 1-7 and 9-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over Goodwin et al (WO 03/086031, as supplied by applicant) in view of Swihart et al (US 4447499).

The instant claims are directed towards a method for coating a substrate with an inorganic-organic hybrid polymer material using the dielectric barrier discharge technique comprising the steps of:

a. Introducing a sample between two electrodes
b. Controlling the atmosphere between the electrodes,
c. Generating a plasma discharge between the electrodes,
d. Mixing aerosols containing hybrid organic/inorganic cross-linked pre-polymers formed via sol-gel processing into the plasma discharge.

Goodwin et al is directed towards a process for depositing coatings on substrates. The process is performed in a system where there are two electrodes with a dielectric plate between them which is used to create a plasma discharge (which is what a dielectric barrier discharge is). The atmosphere between the two electrodes is controlled to form a plasma discharge between them. An atomizer is used to introduce an aerosol of a precursor for a coating forming material into the plasma [0019]. A substrate to be treated is introduced between these electrodes while the atmosphere is being controlled to generate a plasma discharge [0051], the aerosol precursor material is introduced into the plasma discharge [0052], so that a

coating is deposited on the substrate [0053]. Goodwin et al further teaches using different precursors depending upon the desired film, such as polydimethylsiloxane precursor (which is a hybrid inorganic/organic pre-polymer which is formed of smaller cross-linked units) [0040], in order to form an inorganic-organic hybrid polymer material (polydimethylsiloxane) [0046], but does not teach how such precursors are formed.

However, Swihart et al is directed towards coating substrates using polydiorganosiloxanes (including methyl) (abstract), and it teaches that these siloxanes can be formed by conventional methods, including hydrolysis/condensation of dimethylsilanes (col 3, lines 45-56), which is a sol-gel processing.

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to form the polydimethylsiloxanes of Goodwin et al by a sol-gel process, since it was a conventionally known process for creating such molecules and would produce predictable results **(claim 1)**.

12. Regarding **claim 2**, Goodwin et al teaches supplying mixtures of its different precursors, including the non cross-linked silane gas with the polydimethylsiloxane precursor [0040].

13. Regarding **claim 3**, aerosols are mixtures of solids or liquids with gases. As shown in figure 3, the aerosol creating spray nozzle **74** produces an expanding fan-like spray [0052], thus the volume fraction of liquid or solid in the aerosol will decrease as the distance from the nozzle increases (the fluid volume is being diluted by an

increasing volume of the gas in the aerosol). This is a compositional gradient in the pre-polymer material in the aerosol.

14. Regarding **claim 4**, the Goodwin et al process takes place at atmospheric pressure (abstract), which is within applicant's claimed range.

15. Regarding **claim 5**, Goodwin et al teaches using a frequency of 29kHz [0061], which is within applicant's claimed range.

16. Regarding **claims 6 and 13**, the substrate can be a moving web **(claim 13)** [0017], which can comprise a plastic **(claim 6)** [0042].

17. Regarding **claim 7**, the coating is taught to modify the properties of the surface, compared to the uncoated substrate. For instance, by increasing the hydrophobicity [0046].

18. Regarding **claim 9**, the polydimethylsiloxane could be obtained from tetramethoxysilane. The process would require replacing two opposing methoxy groups with methyl groups, which would produce a dimethylsilane with two silicon-bonded hydrolyzable radicals (the methoxys) which could then be hydrolyzed and condensed via a sol-gel process to form the polydimethylsiloxane precursor material.

19. Regarding **claim 10**, Goodwin et al further teaches that the pre-polymer mixture can also comprise colloidal metals [0046].

20. Regarding **claim 11**, Goodwin et al further teaches supplying helium to the plasma [0032], which can be supplied from a separate source **75** from the aerosol nozzle **74** before it is mixed together in the chamber [0052] (figure 3).

21. Regarding **claim 12**, Goodwin et al further teaches that the precursor may be applied as a liquid [0039].

22. **Claims 3** is additionally rejected under 35 U.S.C. 103(a) as being unpatentable over Goodwin et al (WO 03/086031) in view of Swihart et al (US 4447499) as applied to claim 1, further in view of Chow et al (US 20020031658).

Goodwin et al teaches forming multilayer coatings on its substrates [0044], but does not teach how the interfaces between those layers should be formed.

However, Chow et al is also directed towards the spray deposition of organic-inorganic hybrid materials [0013] through aerosols [0032]. It teaches that by varying the composition of the precursor feedstock supplied during spraying , a fine composition gradient can be formed in the coating (abstract), which increases the compatibility of hybrid multilayered materials [0027] and can enhance the thermal, chemical and mechanical stability of the multilayer coatings and enhance control of their properties [0033].

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to supply a compositional gradient in the supplied aerosol precursor during deposition in order to form graded interfaces between the different layers in a multilayered coating in order to increase the layer compatibility, improve the stability of the resulting film and in order to better control the properties of said film **(claim 3)**.

Response to Arguments

23. Applicant's arguments filed June 30th, 2010 have been fully considered but they are not persuasive.

24. Regarding applicant's argument that the teaching of Goodwin requires that the precursor be a liquid or a solid, and that a sol-gel is neither and so does not read upon the claims, the examiner disagrees. First, applicant's claim 12 requires that the precursor be a liquid, so if applicant's contention is correct, claim 12 is not enabled. Second, Goodwin actually teaches that the coating forming material can be solid, liquid or gaseous, or mixtures thereof [0039], so whatever mixture of states that the precursor is in, Goodwin teaches that it can be utilized in its process.

25. Applicant then notes that Swihart, in addition to sol-gel, teaches a number of different techniques as also being suitable for forming polydimethyl siloxane. From this applicant argues that because there are several known ways to make these precursors, the selection to use any one of them could only be produced through hindsight.

Applicant also notes that Goodwin, in addition to polymeric precursors, teaches using monomeric precursors. From this applicant argues that because there are several taught precursors, the selection to use any one of them, such as a polymeric one, could only be produced through hindsight.

In response to applicant's arguments that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a

reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). The examiner's contention is rather that all of these taught methods and precursors would have been obvious to a person of ordinary skill in the art at the time of invention.

26. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., network density, degree of crosslinking) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

27. Applicant then argues that the polymeric precursor of Goodwin in view of Swihart are not "pre-cross-linked pre-polymers." Since the material is polymerized via the sol-gel process of Swihart, it is crosslinked. Since the polymeric precursor is used to make larger molecules in the layer, it is a pre-polymer as well, so Goodwin in view of Swihart does teach it.

28. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., wherein no post-curing step is performed) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

29. Applicant argues that it is unexpected that a precursor molecule formed by a sol-gel process would be able to cross-link at low temperatures or for short periods of time in a plasma. Applicant provides no evidence to suggest that this would be unexpected. Furthermore, plasmas are commonly employed to reduce the temperature required for reactions to occur, since they supply additional energy to the reacting material which then does not need to be supplied to thermal means. This also means that the rate of reaction increases as well for a given temperature.

Conclusion

No current claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571) 270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1712

/David Turocy/
Primary Examiner, Art Unit 1715